3 February 2004

CRUISE RESULTS
NOAA Fisheries Research Vessel ALBATROSS IV
Cruise No. AL 04-01
Ecosystems Monitoring Survey

CRUISE PERIOD AND AREA

The cruise period was 25-27 January 2004. The NOAA fisheries research vessel ALBATROSS IV sampled five randomly located ecosystems monitoring stations located in the southwest and central Gulf of Maine plus the Wilkinson and Georges Basins in the Gulf of Maine (Figure 1) for the Winter Ecosystems Monitoring Survey.

OBJECTIVES

The primary objective of the cruise was to assess changing biological and physical properties which influence the sustainable productivity of the living marine resources of the Gulf of Maine and Georges Bank portions of the northeast continental shelf ecosystem.

Secondary objectives of this cruise involved the following sampling:

- comparison plankton tows in deep basin areas of the Gulf of Maine to assess the difference in zooplankton volumes and composition between tows to 200 m and tows to within 5 meters of the basin bottom. These deep tows would also provide hydrographic data detailing the incursion of Labrador Current Water into the Gulf of Maine.
- collection of phytoplankton samples for nitrogen stable isotope ratios,
- collection of samples for zooplankton genetics (genome) studies,
- examination of plankton samples for concentrations of Calanus finmarchicus to correlate with right whale sightings.

METHODS

The survey consisted of five randomly selected stations at which the vessel stopped to lower instruments over the side. Two additional non-random stations were completed in the Gulf of Maine area to document characteristics of deep basin water transported in by the Labrador Current. A total of seven stations were sampled. Key parameters measured included water column temperature, salinity, and chlorophyll-a fluorescence, ichthyoplankton and zooplankton composition, abundance and distribution, and along-track chlorophyll-a fluorescence.

A double oblique tow using the 61-centimeter Bongo sampler and a Seabird CTD with a fluorometer was made at 7 stations. The tow was made to approximately 5 meters above the bottom, or to a maximum depth of 200 meters, at the five randomly located stations and to within five meters above the bottom to a depth of 244 meters in the Wilkinson Basin and 348 meters in Georges Basin. All tows were conducted at a ship speed of 1.5 knots. In Wilkinson Basin the ship returned to the same position that the 200 meter tow had started at to carry out the deep tow to within five meters of the bottom. In Georges Basin, the deep tow was done first. A second planned comparative tow to 200 meters was not carried out due to deteriorating weather conditions. Rising winds and seas, combined with sub-freezing temperatures caused extensive ice formation on the vessel, making gear deployment and retrieval hazardous. The cruise was aborted at this point.

Plankton sampling gear consisted of a 61-centimeter mouth diameter aluminum Bongo frame with two 335-micron nylon mesh nets. A 45-kilogram lead ball was attached by an 80-centimeter length of 3/8-inch diameter chain below the aluminum Bongo frame to depress the sampler. A digital flowmeter was suspended within the mouth of each sampler to determine the amount of water filtered by each net. The plankton sampling gear was deployed over the port side of the vessel by means of a conducting-cable winch and a powered boom. After each tow the CTD unit was left plugged in to the tow cable and brought forward to be stored in the sheltered work area of the aft deck, under large deck lights. The Bongo frame and nets were also brought to this area for rinsing out the samples, and were left there until the subsequent station. This arrangement prevented the equipment from getting covered with sea-spray and icing up, and was also a much safer environment for the deck person retrieving the samples to work in. The 61-centimeter Bongo plankton samples were preserved in a 5 percent solution of formalin in seawater. Tow depth was monitored in real time with a Seabird CTD profiler. The Seabird CTD profiler was hard-wired to the conductive towing cable, providing simultaneous depth, temperature, salinity and chlorophyll-a fluorescence data for each plankton tow.

One phytoplankton sample for nitrogen-stable isotope ratio analysis was collected from the discharge water of the near-surface flow-through system. A sample of one thousand milliliters of seawater was pre-filtered through 300 micron mesh nitex gauze to remove most zooplankton, then filtered through a Whatman glass-fiber filter and flash frozen for analysis ashore.

A zooplankton genetics sample was collected at one randomly selected station in the Gulf of Maine region. This sample was collected with a 20 cm Bongo frame fitted with paired 165-micron mesh nets and this array was attached to the towing wire above the Seabird CTD with a wire stop. The sample was preserved in 95% ethanol. After 24 hours of initial preservation, the alcohol was changed.

After the cruise, stations with large amounts of Calanus finmarchicus were measured for settled volumes

(Table 1.) and the data forwarded to Pat Gerrior, the Regional Right Whale Sighting Coordinator, and Tim Cole, of the NEFSC Protected Species Branch, Large Whale Group.

Continuous monitoring of the seawater salinity, and chlorophyll-a level, was done at a depth of 3.7 meters along all of the cruise track by means of a thermosalinograph, and a flow-through fluorometer. The Scientific Computer System (SCS) recorded the output from both the thermosalinograph, and the fluorometer at ten seconds intervals. The data records were given a time-date stamp from the GPS unit.

Samples for Seabird CTD salinity and fluorometer sensor data calibration were obtained on the 12-6 watch by taking a water sample from 30 or more meters depth using a 1.7 liter Niskin bottle. Calibration of the fluorometer and CTD salinities from the surface flow-through system was undertaken on the 6-12 watch. Sample analysis for these calibrations followed the protocol outlined in the Ecosystem Monitoring Program Operations Manual.

RESULTS

A summary of routine survey activities is presented in Table 1. Areal coverage for the cruise is shown in Figure 1. The ALBATROSS IV was originally scheduled to depart on January 20, 2004, but sailing was postponed until January 24 to allow completion of dockside repair work. Sailing was further delayed until January 25 due to extensive ice coverage in Woods Hole Harbor which prevented the ALBATROSS IV from leaving the dock. The tugboat JAGUAR arrived from New Bedford to break up the four-inch thick ice around the hull, permitting the ship to leave. Sailing took place at 1000 hours EST on Sunday January 25, 2004 from the NEFSC, Woods Hole Massachusetts. Weather conditions were extremely cold, and the long term sub-freezing conditions had also caused the formation of extensive ice cover in the Nantucket Sound area which limited the vessel's cruising speed. Ice free water was not encountered until the vessel exited from the Great Round Shoal Channel. Due to the forecast of a possible storm arriving later in the week, a decision was made to try and cover as much area as possible by skipping stations that were relatively close together, in order to cover at least two thirds of the Gulf of Maine region while hitting the required minimum number of stations. This strategy worked well for the first 24 hours of the cruise, as the ALBATROSS IV completed four widely spaced stations, in the southwestern and central Gulf of Maine (Figure 1). Comparison tows in the Wilkinson Basin were also made in order to meet the secondary objective of collecting biological and hydrographic data from the deep basin regions. It was decided to expend some time on the deep basin data objective since there was a possibility that if the bad weather struck earlier than predicted, it might not be possible to meet the primary objective of sampling a minimum number of randomly placed ecosystem monitoring stations from two thirds of the Gulf of Maine.

Unfortunately this worst-case scenario developed late on Monday, as winds and seas increased when the ALBATROSS IV approached the Georges Basin for the second set of comparison tows. At this point the weather was deteriorating so quickly that the deep tow to 348 m was done first to obtain hydrographic data from the entire water column, in the event that it might not be possible to do a second cast. It became so difficult to retrieve the sampling gear due to the combination of icy decks and rough conditions that it was decided to cease all work once the equipment was safely on deck. The ALBATROSS IV then returned to Woods Hole in advance of the forecast 40+ knot winds. It was

necessary to proceed south of Nantucket and Martha's Vineyard to avoid ice in the Great Round Shoal Channel. After making its way through ice floes around the piers, the ALBATROSS IV tied up at the fisheries dock at 1800 EST on January 27, 2004, marking the end of the Winter Ecosystems Monitoring Cruise AL0401.

DISPOSITION OF SAMPLES AND DATA

All samples and data, except for the nitrogen isotope sample, the zooplankton genetics sample and the Seabird CTD data, were delivered to the Ecosystems Monitoring Group of the NEFSC, Narragansett, RI, for quality control processing and further analysis. The nitrogen isotope sample was delivered to Rick McKinney at the US EPA Lab in Narragansett, RI. The zooplankton genetics sample was deposited at the Woods Hole Oceanographic Institute. The CTD data was delivered to the Oceanography Branch of the NEFSC, Woods Hole, MA. Copies of the CTD logs and electronic data header files were retained by the Ecosystems Monitoring Group in Narragansett. Calanus volume information was forwarded to Pat Gerrior and Tim Cole after the cruise was completed.

SCIENTIFIC PERSONNEL

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Table 1. STATION OPERATION REPORT FOR CRUISE AL0401

CAST	STA.	Date(GMT) mm	dd	yy	TIME(GMT) hr	min	LAT	LONG	DEPTH m	OPER. B=bongo W=water Z=zoogen N=nitrogen V=vertical cast (CTD only) D=deep tow CO=Calanus observed/vol
1	1	1	25	2004	22	41	4117.7	6925.7	41	B
2	2	1	26	2004	3	59	4207.8	6939.8	210	B, CO/317cc
3	3	1	26	2004	6	39	4230.1	6940.1	249	Wilkinson Basin W
4	3	1	26	2004	6	47	4230.1	6940.1	248	Wilkinson Basin B, CO/211cc
5	3	1	26	2004	7	22	4230.1	6940.1	251	Wilkinson Basin B,D, CO/343cc
6	4	1	26	2004	11	42	4210.3	6851.3	179	B, Z1, CO/211cc
7	5	1	26	2004	14	28	4229.6	6835.5	199	B, CO/132cc
8	6	1	26	2004	18	38	4226.1	6801.0	175	W,N1
9	6	1	26	2004	18	49	4226.0	6800.9	175	B
10	7	1	27	2004	00	15	4225.1	6700.5	358	Georges Basin B, D, CO/317cc

TOTALS:
Bongo Casts = 8(of these 2 were deep basin tows)
Bongo 6B3Z Samples = 7
Bongo 6B3I Samples = 7
Water Samples = 2
CTD Casts = 10
Nitrogen samples = 1
Zoogen samples = 1
Calanus observations = 6

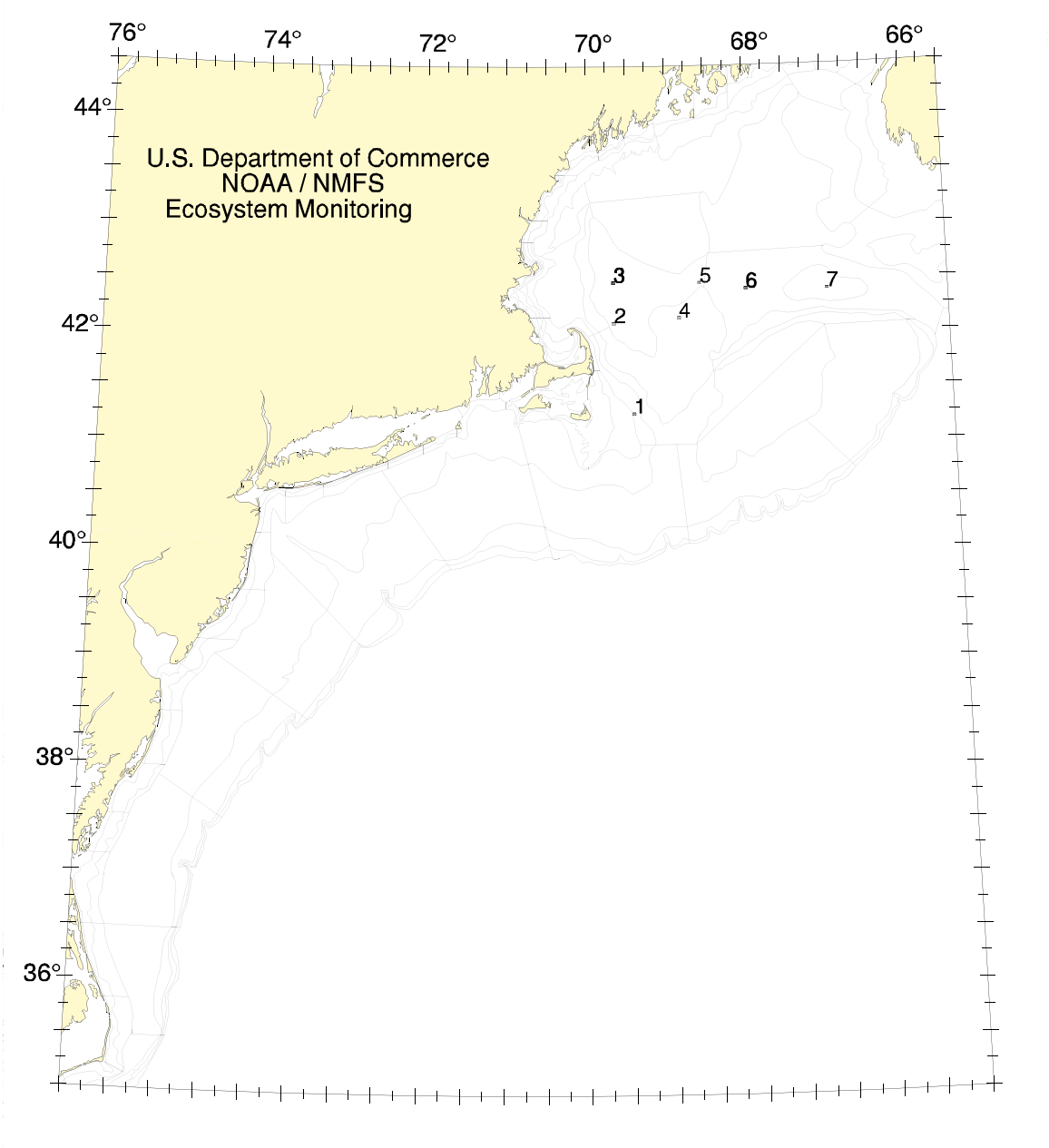

Figure 1. Station locations numbered consecutively for Winter Ecosystems Monitoring Cruise AL 04-01, 25 - 27 January 2004.